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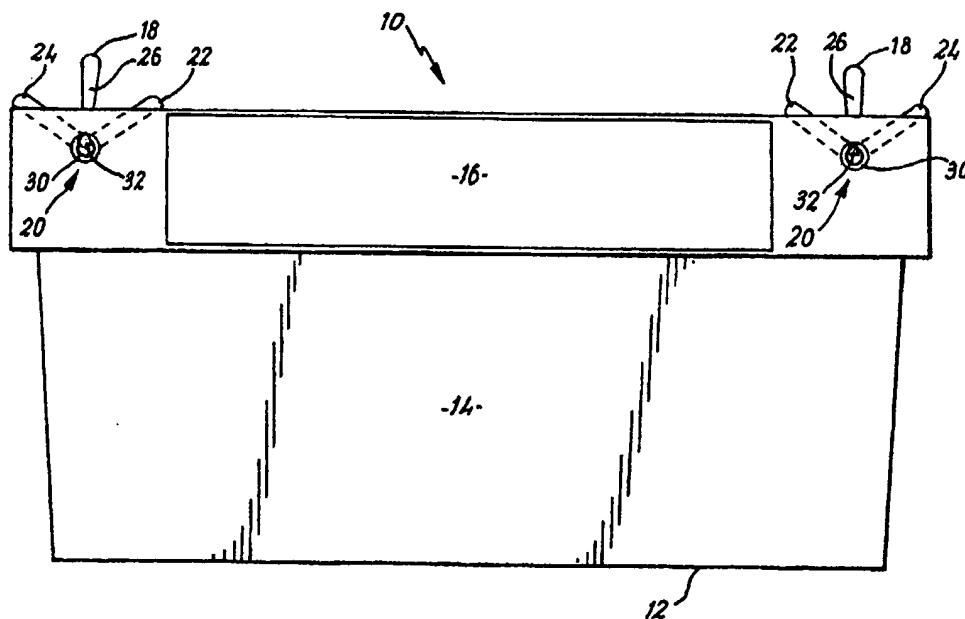
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GB 2353274 A GB 2333285 A  
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INT CL<sup>7</sup> B65D 21/02 21/04 21/06  
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(54) Abstract Title  
**A Stackable and Nestable Container**

(57) An open-topped container 10 has a base 12 and upstanding walls 14 which rise to a rim 16 on which stacking bars 18 are mounted for movement between a stacking position overlying the container mouth and a nesting position clear of the container mouth. The mounting 20 of the stacking bars 18 comprises a foot 32 carrying an oversized head 34 formed to retain the foot 32 in an opening 30. In the event of a load being applied to the stacking bar 18, tending to withdraw the foot 32 from the opening 30, co-operation between head 34 and opening 30 creates a force directed to oppose the withdrawal of the foot 32.

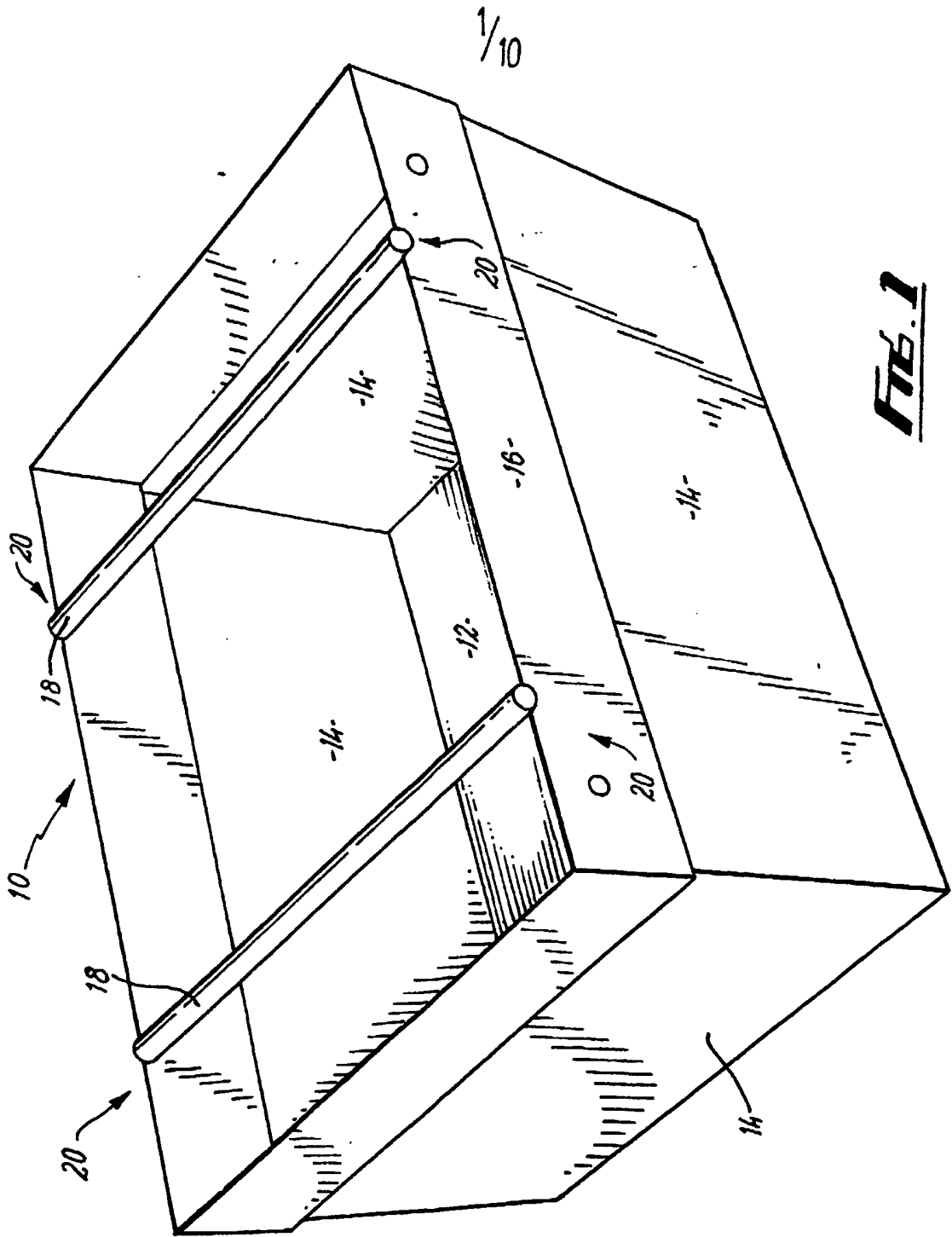


**FIG. 2**

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy. The claims were filed later than the filing date but within the period prescribed by Rule 25(1) of the Patents Rules 1995. The print reflects an assignment of the application under the provisions of Section 30 of the Patents Act 1977.

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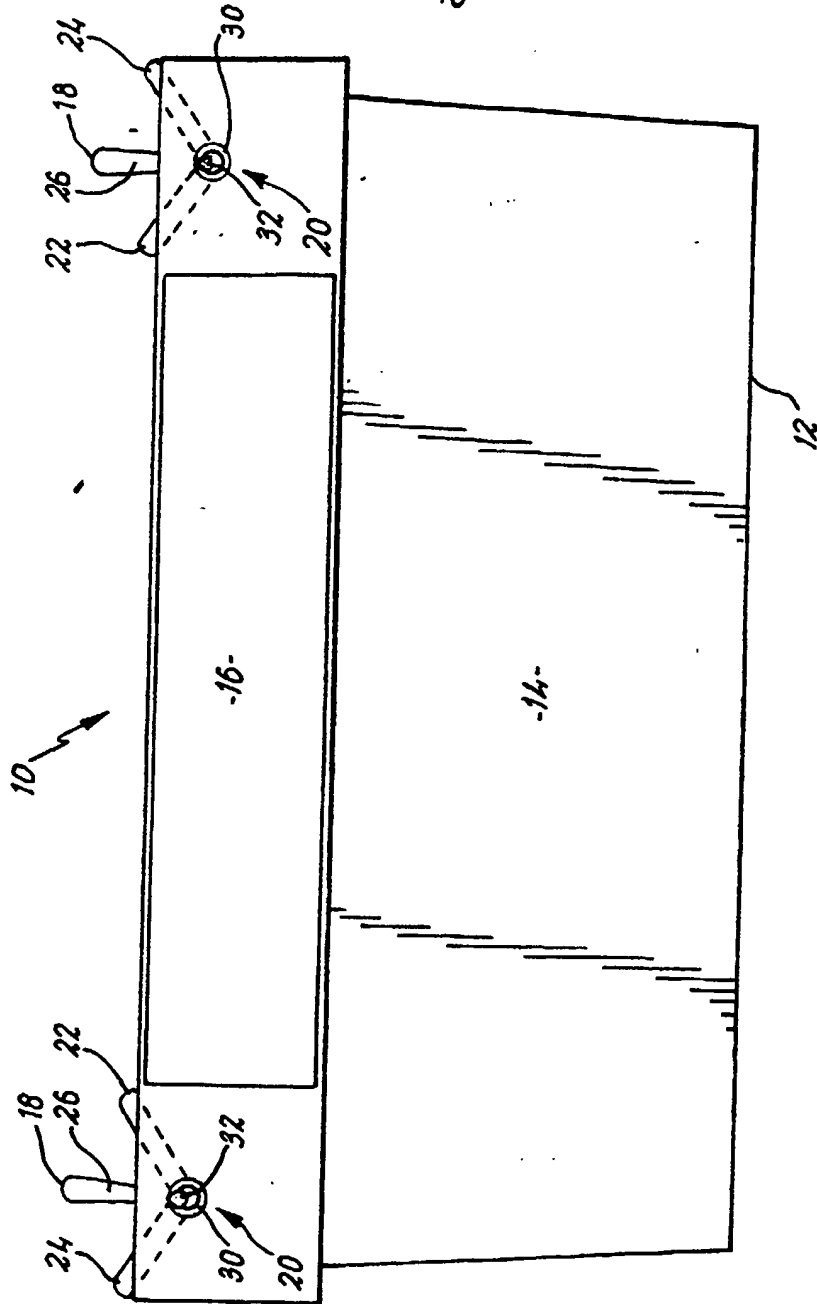
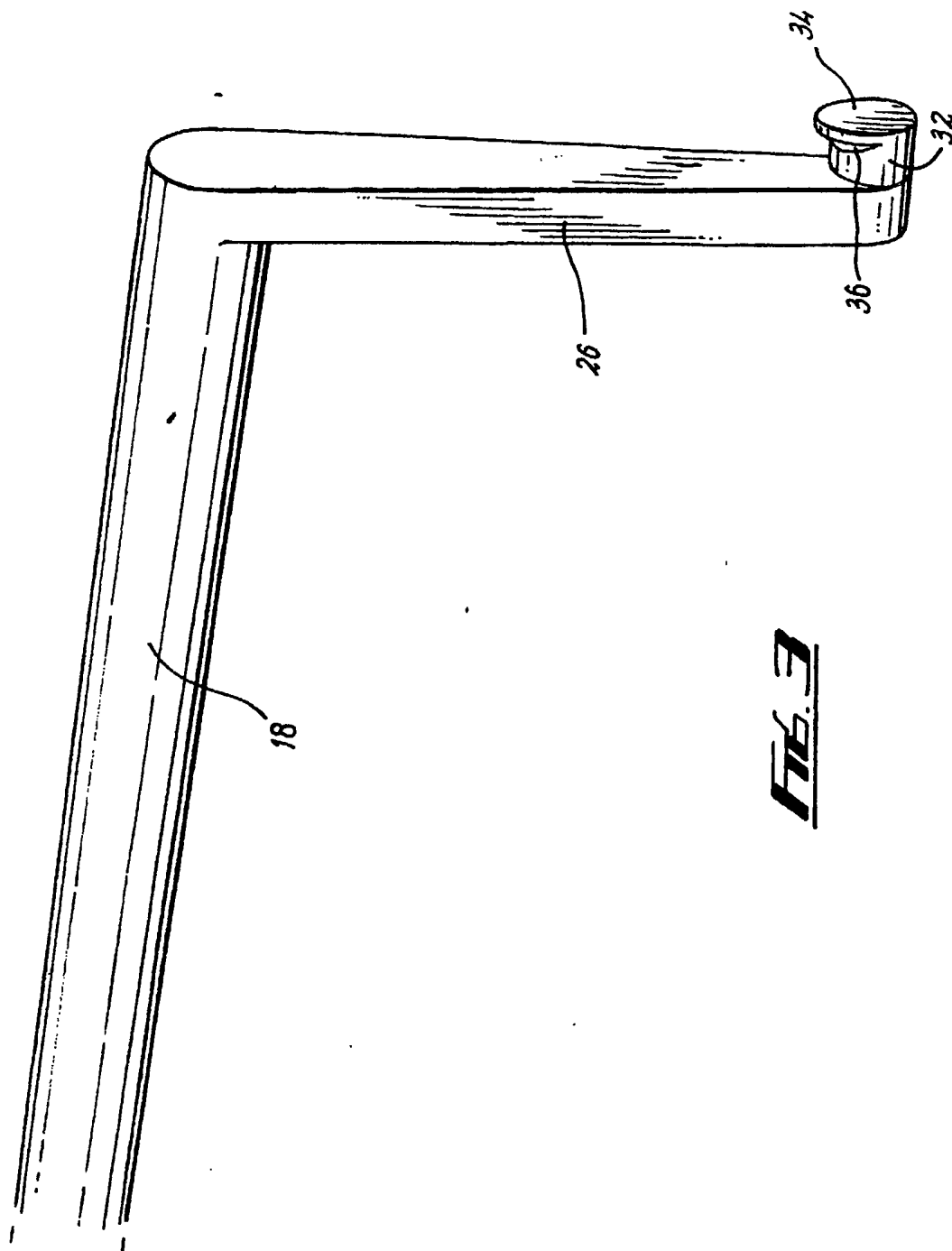


Fig. 2

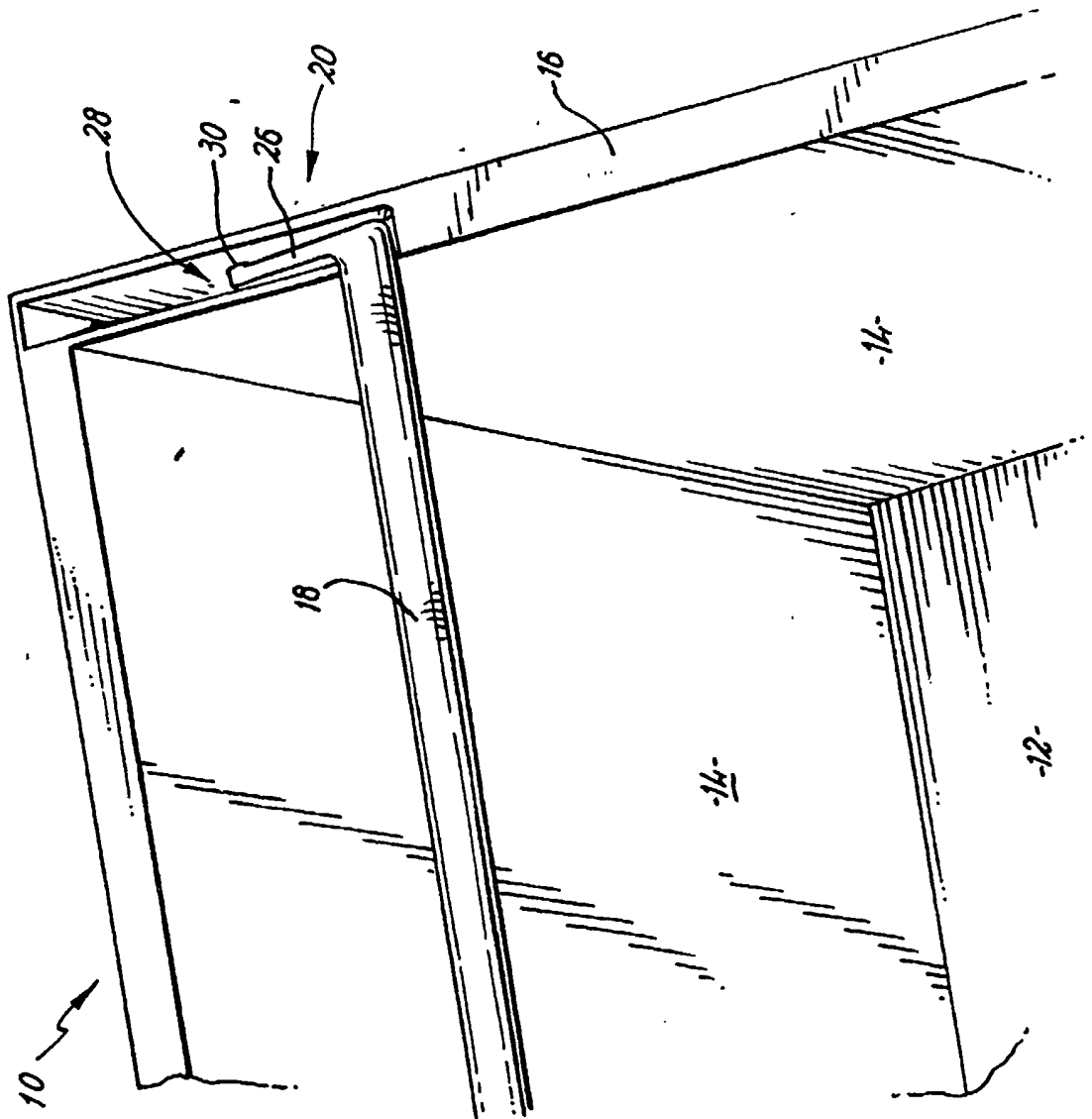
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**FIG. 3**

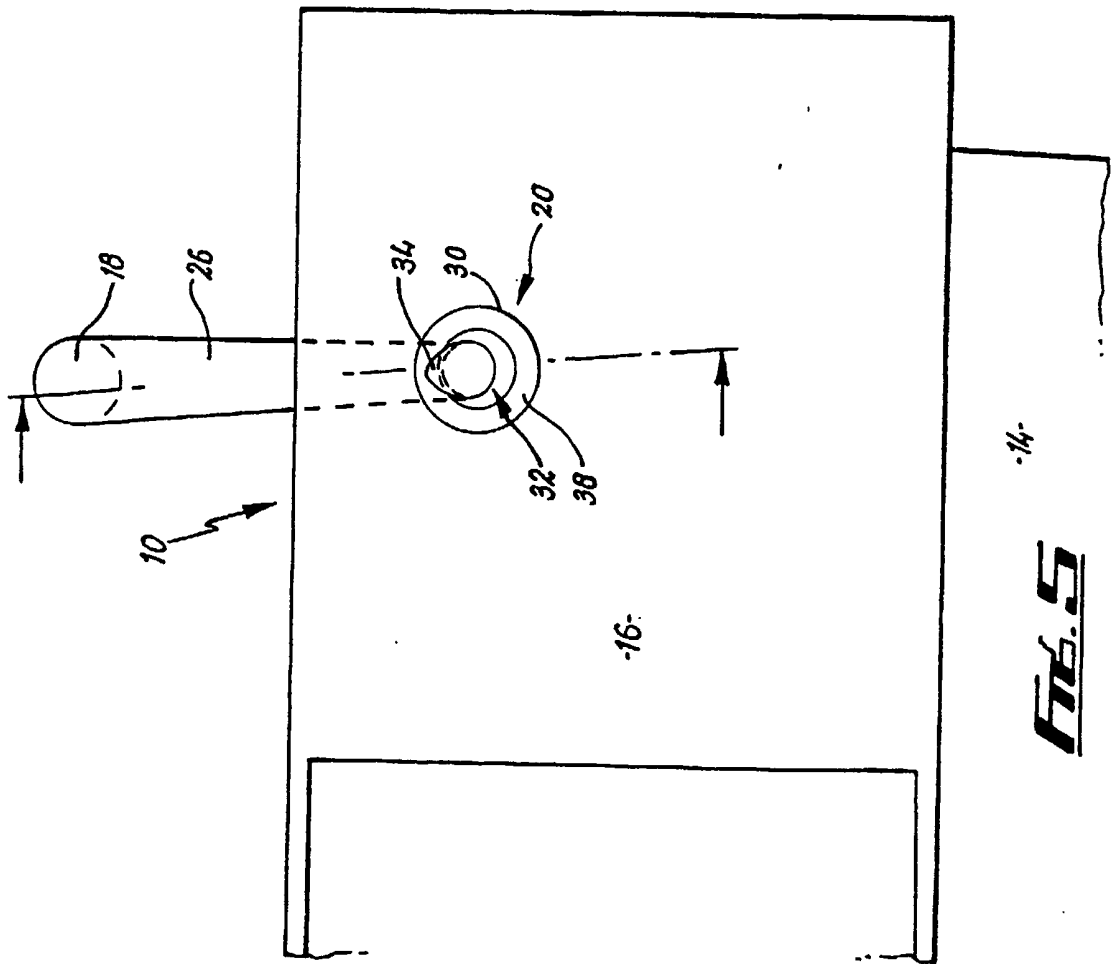
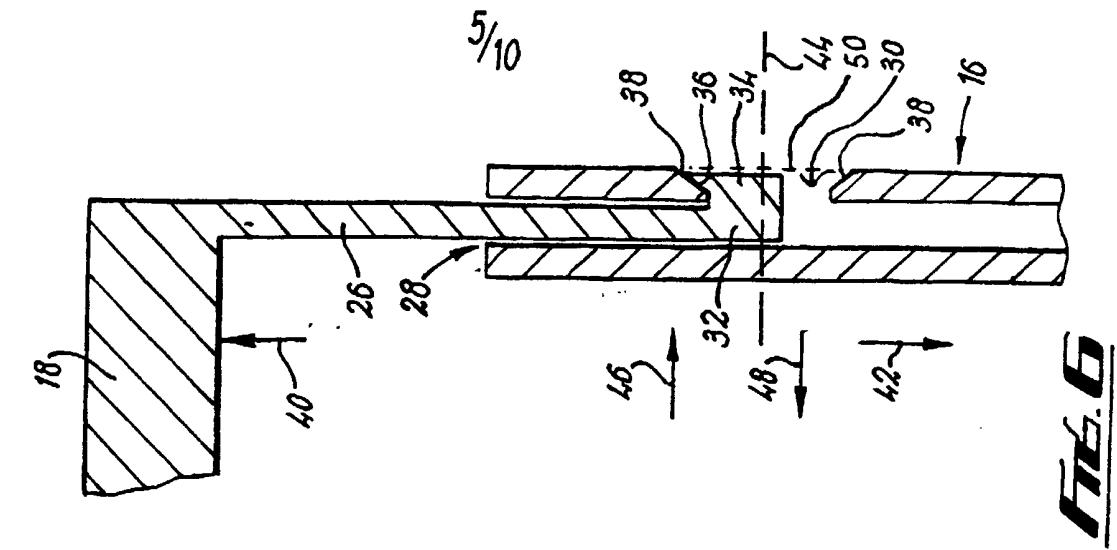
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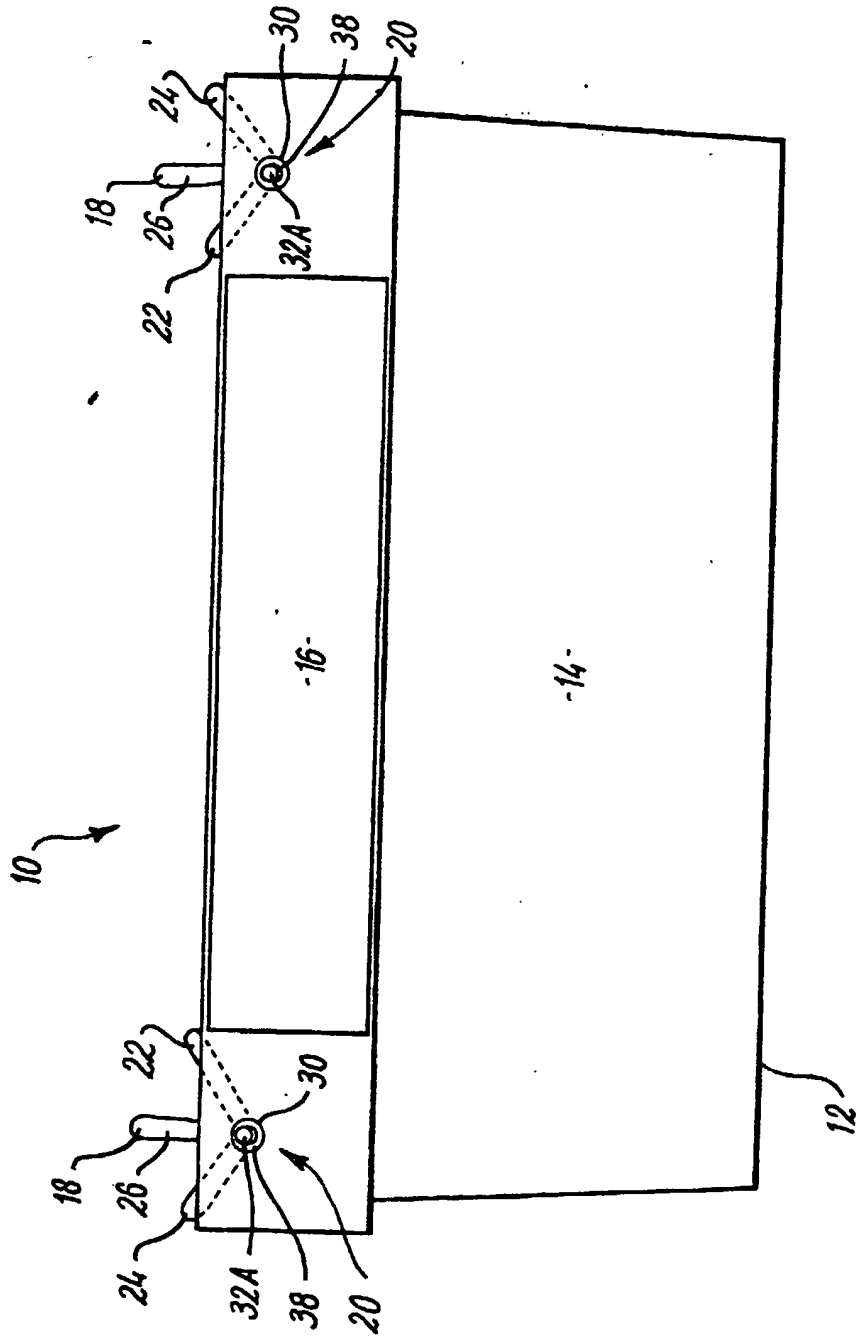
**FIG. 9**

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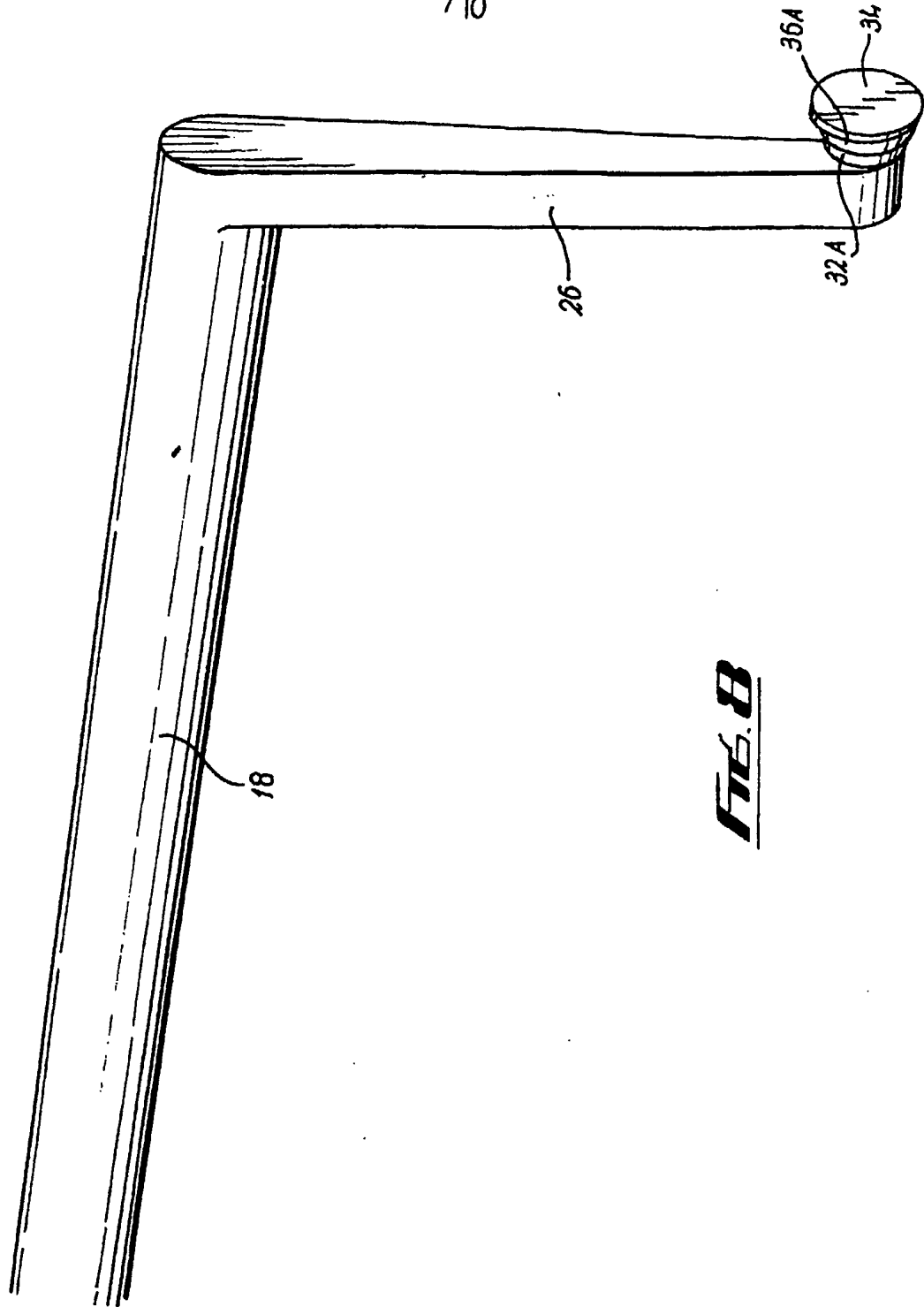
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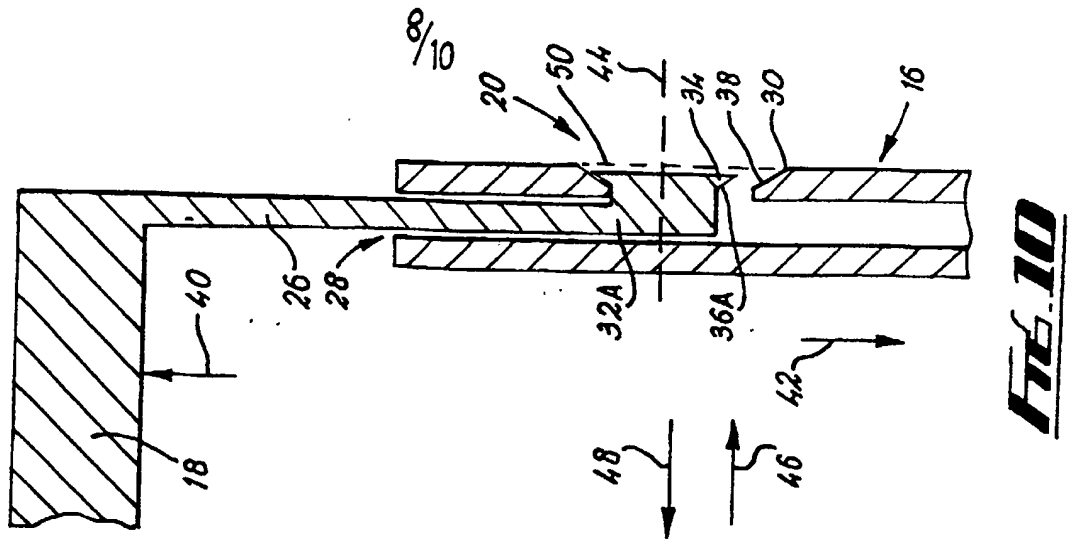
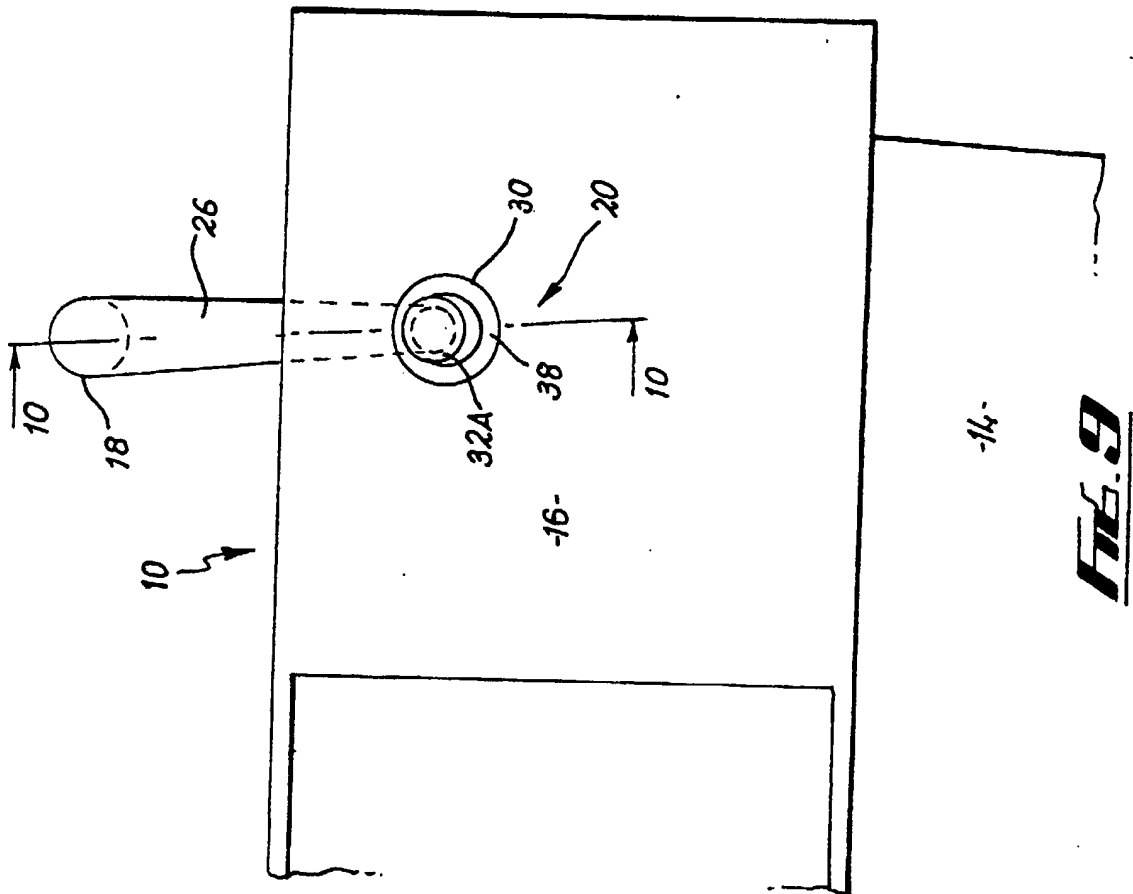
**FIG. 7**

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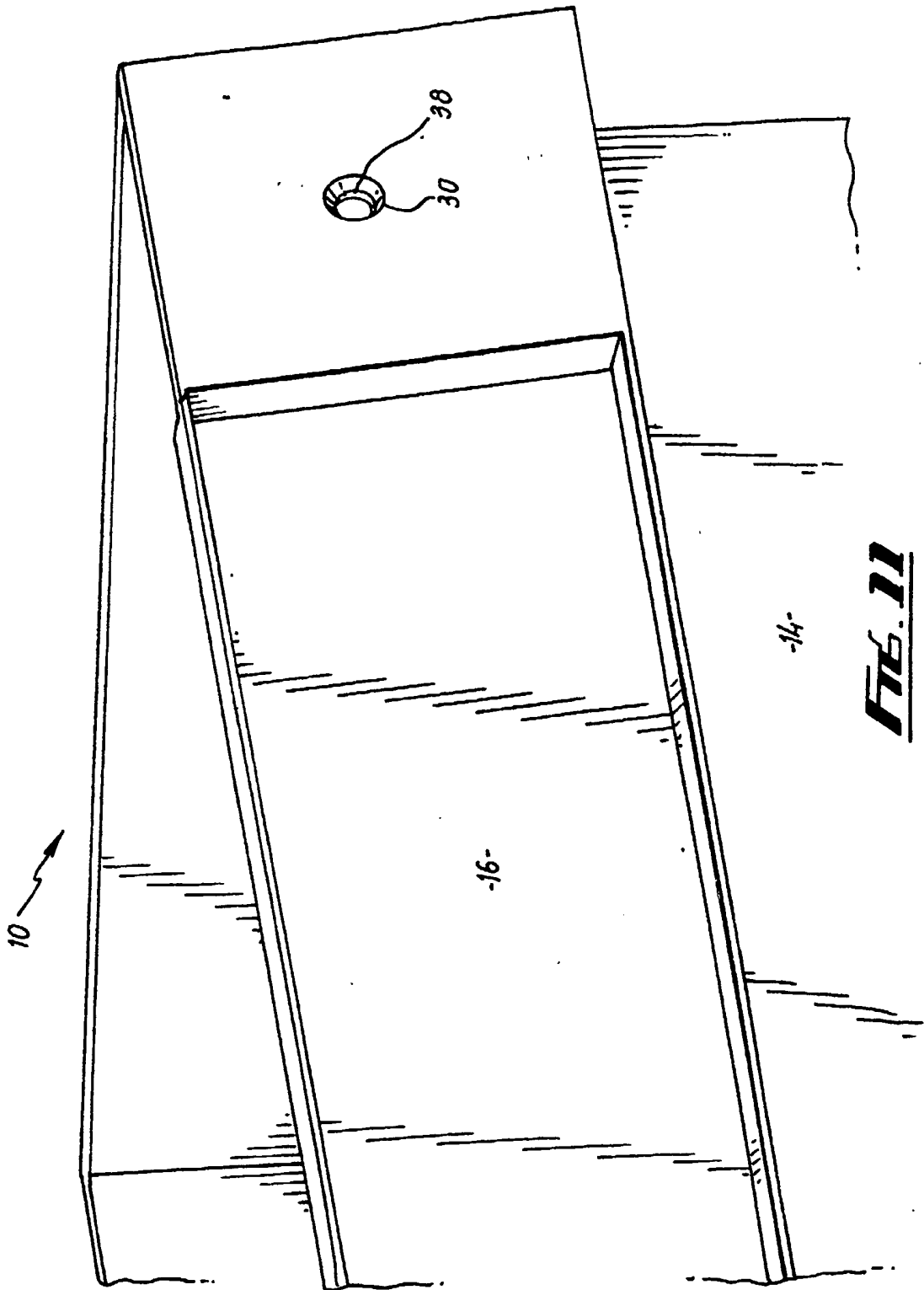
**FIG. 8**



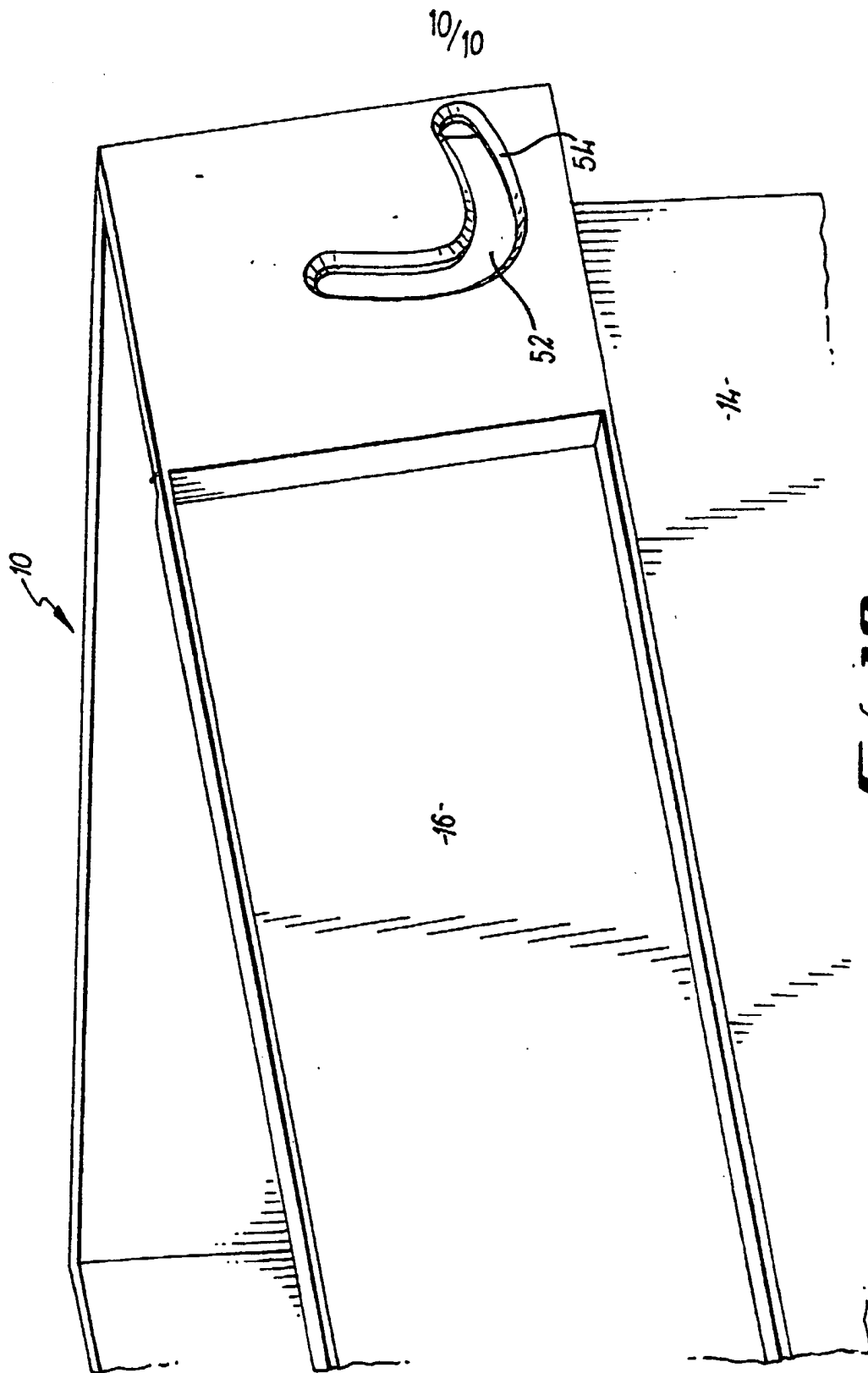


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**FIG. 11**



**FIG. 12**

Container

The present invention relates to containers.

The conventional form of stacking and nesting container comprises two bale arms, stacking bars or support bars pivotally attached to the sides of the container, usually at opposed ends of the container. Each bale arm can be moved from a nesting position to a stacking position in which it extends across the mouth of the container, to support a second container stacked on top. In the nesting position, the bale arms are in a position in which they do not obstruct the second container, which can therefore nest in the container below.

Bale arms and their mounting arrangements are designed to bear downward forces arising from containers stacked on top. However, we have realised that containers are vulnerable to damage if they are mishandled during use by using the bale arms as handles for lifting filled containers, thereby exerting forces on the container in a direction generally opposite to the direction for which the bale arms and their mounting arrangements were designed. We envisage that damage to the container could arise in this manner. In particular, we envisage that bale arms could be pulled off the container, causing the container to be dropped.

According to the present invention, there is provided an open-topped container comprising at least one support member mounted on the container walls for movement between a stacking position at which the support member can provide support for a second container to form a stack, and at least one alternative position, the mounting of the support member comprising a mounting portion located in an opening to be movable therein as the support member moves between positions, the mounting portion and the opening being formed to cooperate in the event of a load being applied to the support member tending to withdraw the mounting portion from the opening, the co-operation serving to create a force directed to oppose the withdrawal of the mounting portion.

Preferably the mounting portion and the opening are formed to create the opposing force by means of a camming action therebetween. Preferably at least one of the mounting portion and the walls of the opening comprise a surface which is inclined relative to the direction of withdrawal created by a load. Both the mounting portion and the opening walls preferably comprise inclined surfaces which bear on each other in the event of a withdrawal load, to create an opposing force.

Preferably the mounting portion is turnable within the opening, thereby to provide a pivotal mounting of the support member. The mounting portion and the opening are preferably formed to cooperate as aforesaid over a range of orientations of the mounting portion relative to the opening. At least one of the mounting portion and the opening may have a surface of rotation which has an axis substantially parallel with or substantially coaxial with the axis about which the mounting portion is rotatable within the opening. Preferably both the mounting portion and the opening have surfaces of rotation as aforesaid, arranged to cooperate to provide a camming action therebetween.

Preferably, the or each surface of rotation is continuous around the axis.

The opening may have a length along which the mounting portion is movable as the support member moves between positions.

Examples of the present invention will now be described in more detail, by way of example, and with reference to the accompanying drawings, in which:-

Fig. 1 is a general schematic perspective view of a container according to the present invention;

Fig. 2 is a side elevation of a first embodiment of the invention;

Fig. 3 is a partial perspective view, on an enlarged scale, of a support

member for use with the first embodiment;

Fig. 4 is a partial perspective view of one corner of the container of Fig. 2;

Fig. 5 is an enlarged partial side elevation of one corner of the container of Fig. 2;

Fig. 6 is a vertical section along the lines 6-6 of Fig. 5;

Figs. 7, 8, 9 and 10 correspond with Figs. 2, 3, 5 and 6, illustrating a second embodiment of the invention;

Fig. 11 is an enlarged perspective view of one corner of the container either embodiment, with the support member removed; and

Fig. 12 corresponds with Fig. 11, illustrating a further alternative embodiment.

Fig. 1 shows a container 10 which has a base 12 and upstanding walls 14 which rise to a rim 16 on which support members or stacking bars 18 are mounted. The stacking bars are mounted on the walls 14 by means of mounting arrangements 20 within the rim 16. Corresponding mounting arrangements 20 are provided at each end of each stacking bar 18. The mounting arrangements allow the stacking bars 18 to pivot between two positions. In the position shown in Fig. 1, the stacking bars 18 overlie the opening mouth of the container, to provide support for a second container stacked on the container 10. Alternatively, the stacking bars 18 can pivot to a nesting position clear of the container mouth, so that an upper container can be nested into the container 10. When nested, the rim 16 of an upper container will rest on the rim 16 of a lower container and in order to facilitate this, the walls 14 slope outwardly from the base 12 to the rim 16.

The first embodiment according to the present invention can now be

described in more detail, by reference particularly to Figs. 2 to 5.

Fig. 2 illustrates the stacking bars 18 in an intermediate position between the stacking position 22 and the nesting position 24. The stacking bars 18 will move through the intermediate position when pivoting between the positions 22, 24 by virtue of the pivotal connection provided at 20. The stacking bars 18 and the mounting arrangements 20 are designed primarily to bear downward forces arising from a stacked container seated on top of the bars 18, but when in the intermediate position of Fig. 2, the bars 18 form attractive handles for use in lifting the container 10. Conventional containers are not designed to bear loads arising in this manner. Instead, handle formations are incorporated into the rim 16. In the containers shown in the drawings, provision is made to accommodate mishandling by lifting the container by means of the bars 18. This provision arises from features of the mounting arrangements 20, which can now be described in more detail.

There is a mounting arrangement 20 at each end of each bar 18, reversed as a mirror image as appropriate. In each arrangement 20, the end of the bar 18 carries a leg 26 which reaches down into a slot 28 in the rim 16. One wall of the slot 28 (the outer wall in these examples, but the inner wall could be used) is provided with an opening 30 to receive a foot 32 carried by the lower end of the leg 26. The foot 32 is in the form of a short boss of generally circular cross-section having a central axis substantially parallel with the length of the bar 18 and carrying an oversized head 34. The head 34 is formed to retain the foot 32 in the opening 30 by co-operation with the opening 30, as can now be described in more detail, with particular reference to Figs. 5 and 6.

In this example, the head 34 is in the form of a toe extending from the foot 32 toward the bar 18 and having a chamfered rear face 36. The opening 30 is substantially circular. The outer edge of the opening 30 is chamfered at 38. The chamfer 38 preferably extends around the entire perimeter of the opening 30, for instance as a surface of rotation formed around the central axis of the opening 30. In this manner, the foot 32 is free to turn in the opening 30 while

the rear face 36 slides around the chamfer 38, so that contact is maintained between the rear face 36 and the chamfer 38 at substantially all orientations of the foot 32 relative to the opening 30.

The rear face 36 and the chamfer 38 are therefore able to cooperate in a form of camming action, as can now be described in particular with reference to Fig. 6. In the event that the container 10 is lifted by means of the bars 18, an upward force 40 will be applied to the bar 18. The weight of the container and its contents will create a downward force 42. This will force the rear face 36 and the chamfer 38 toward each other in a direction generally perpendicular to the axis 44 of the opening 30, about which the foot 32 turns within the opening 34. The result of the camming action between the rear face 36 and the chamfer 38 is to create a force 46 which opposes any tendency for the foot 32 to be pulled out of the opening 30 in the direction 48, thus tending to pull the foot 32 securely into the correct axial position relative to the opening, retaining the stacking bar 18 securely on the container rim 16 and thus allowing the container 10 to be lifted by grabbing the bars 18, with reduced risk of damage to the container, particularly damage by disconnection of the bars 18 from the rim 16. Such damage could result in the container and its load being dropped with consequent danger to workers and to the container contents.

A particular advantage of the arrangement illustrated in Figs. 2 to 6 is that the provision of the chamfer 38 allows the toe 34 to be provided within the "footprint" of the container 10, that is without any part of the foot 32 projecting beyond the plane 50 of the rim 16. Thus, the improved handling safety is achieved without the container 10 having an increased footprint, which could make the improved container incompatible with existing containers or handling equipment.

A second embodiment is illustrated in Figs. 7 to 10. This embodiment is very similar to the embodiment described above. The same reference numerals are therefore used for features which are the same in both embodiments, whereas features which differ but closely correspond are given numerals with



the suffix A in figs. 7 to 10.

The differences between these two embodiments relate to the foot 32, 32A. In particular, whereas the head is formed as a toe 34 in the first embodiment, the head of the second embodiment provides a frusto-conical rear face 36A in the second embodiment. The frusto-conical face 36A is able to cooperate with the chamfer 38 in the manner described above, in order to resist withdrawal of the foot 32A from the opening 30, when the container 10 is lifted by the stacking bars 18. However, in this embodiment, symmetry provided by the frusto-conical face 36A will tend to cause the foot 32A to rise to the top of the opening 30 and engage with the chamfer 38 at the uppermost point of the opening 30, regardless of the initial position of the foot 32A within the opening 30. This is believed to convert the forces 40, 42 more efficiently into an appropriate opposing force 46.

The embodiments described above have both used a circular opening 30, as shown in Fig. 11, from which the stacking bars 18 have been removed. A circular opening 30 is appropriate to provide a simple pivot mounting for the stacking bars 18, allowing them to swing between the stacking position 22 and the nesting position 24, as described. This corresponds with the movement provided for stacking bars in many conventional containers. In other containers, the stacking bars 18 have more than one stacking position, at respective heights above the base 12. In one proposal, these are reached by mounting the stacking bars 18 by means of a slot rather than a circular opening, so that the bars 18 can move by an action which combines rotation with movement of the rotation axis along the length of the slot. In some cases, the shape of the slot can be quite complex, depending on the form of the bars 18 and the required locations of the stacking positions.

Fig. 12 illustrates a generally L-shaped slot 52 which allows the benefits of the present invention to be incorporated in a container having stacking bars 18 with a plurality of stacking heights. These will be reached by a combination of rotation of the foot 32, 32A within the slot 52, and movement of the foot 32,

32A along the slot 52. The entire periphery of the slot 52 is provided with a chamfer 54, so that the cooperation described above is available at any position of the foot 32, 32A within the slot 52. The foot is preferably the foot 32A of the second embodiment, in order to ensure that this co-operation is also available at any orientation of the foot 32A relative to the slot 52.

Many variations and modifications can be made to the apparatus described above, without departing from the scope of the present invention. In particular, dimensions, shapes, relative dimensions and relative shapes can be varied widely, particularly with reference to the required size and use of the resulting container. The containers are preferably manufactured from moulded thermoplastic material, but other materials and manufacturing processes could be used. The bars 18 may be moulded components, or metal. Various other shapes and sizes of foot and head could be provided for the mounting arrangements. The camming action between the rear faces 36, 36A and the chamfer 38, 54 relies on two surfaces sloped relative to the axis of the foot 32, 32A but similar effects could be provided without providing both surfaces. In particular, a foot 32, 32A of the same general form as shown in the drawings could be used to cooperate with an unchamfered edge around an opening 30, but this would have the disadvantage of causing the toe 34 to project beyond the footprint of the rim 16.

Whilst endeavouring in the foregoing specification to draw attention to those features of the invention believed to be of particular importance it should be understood that the Applicant claims protection in respect of any patentable feature or combination of features hereinbefore referred to and/or shown in the drawings whether or not particular emphasis has been placed thereon.

CLAIMS

1. An open-topped container comprising at least one support member mounted on the container walls for movement between a stacking position at which the support member can provide support for a second container to form a stack, and at least one alternative position, the mounting of the support member comprising a mounting portion located in an opening to be movable therein as the support member moves between positions, the mounting portion and the opening being formed to cooperate in the event of a load being applied to the support member tending to withdraw the mounting portion from the opening, the co-operation serving to create a force directed to oppose the withdrawal of the mounting portion.
2. A container according to claim 1, wherein the mounting portion and the opening are formed to create the opposing force by means of a camming action therebetween.
3. A container according to claim 2, wherein at least one of the mounting portion and the walls of the opening comprise a surface which is inclined relative to the direction of withdrawal created by a load.
4. A container according to claim 3, wherein both the mounting portion and the opening walls comprise inclined surfaces which bear on each other in the event of a withdrawal load, to create an opposing force.
5. A container according to any of the preceding claims, wherein the mounting portion is turnable within the opening, thereby to provide a pivotal mounting of the support member.
6. A container according to claim 5, wherein the mounting portion and the opening are formed to cooperate as aforesaid over a range of orientations of the mounting portion relative to the opening.
7. A container according to claim 6, wherein at least one of the mounting

portion and the opening has a surface of rotation which has an axis substantially parallel with or substantially coaxial with the axis about which the mounting portion is rotatable within the opening.

8. A container according to claim 7, wherein both the mounting portion and the opening have surfaces of rotation as aforesaid, arranged to cooperate to provide a camming action therebetween.

9. A container according to claims 8 or 9, wherein the or each surface of rotation is continuous around the axis.

10. A container according to any of the preceding claims, wherein the opening has a length along which the mounting portion is movable as the support member moves between positions.

11. A container substantially as hereinbefore described with reference to Figs. 1 to 6 and 11 of the accompanying drawings.

12. A container substantially as hereinbefore described with reference to Figs. 7 to 11 of the accompanying drawings.

13. A container substantially as hereinbefore described with reference to Fig. 12 of the accompanying drawings.

14. Any novel subject matter or combination including novel subject matter disclosed herein, whether or not within the scope of or relating to the same invention as any of the preceding claims.



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**Application No:** GB 0105175.4  
**Claims searched:** 1-13

**Examiner:** Marian Challis  
**Date of search:** 15 July 2002

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.T): B8P (PK5, PU)

Int Cl (Ed.7): B65D 21/02, 21/04, 21/06

Other: Online: PAJ, WPI and EPODOC

### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2353274 (LIMPAC MOULDINGS LTD) Figures 1-9	1,5,6,10
X	GB 2333285 (LIMPAC MOULDINGS LTD) Figures 1-5	1-3,5,6,10
X	US 5469986 (JANG) Figures 1-10	1-10

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

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